

## CLAIMS

1. Pneumatic tire (1) comprising:

- a carcass structure (2) having at least one carcass ply (2a), and at least one annular reinforcing structure (3) associated to said carcass ply (2a),
- 5       - a pair of axially opposite side walls (7, 8) on said carcass structure (2),
- a belt structure (5) arranged at a radially outer position with respect to said carcass structure (2) and
- 10       - a tread band (6), arranged at a radially outer position with respect to said belt structure (5), and generally consisting of a first elastomeric material incorporating at least one portion (9) substantially consisting of a second elastomeric material;

wherein the tread band (6) comprises at least one groove (11) defined in said at least one portion (9) substantially consisting of the second elastomeric material;

15       wherein the ratio between the modulus of elasticity ( $E'$ ) under compression at 100°C of the second elastomeric material and the modulus of elasticity ( $E'$ ) under compression at 100°C of the first elastomeric material is not lower than about 1.30; and

20       wherein the ratio between the IRHD hardness at 100°C of the second elastomeric material, measured in accordance with standard ISO 48, and the IRHD hardness at 100°C of the first elastomeric material, measured in accordance with standard ISO 48, is lower than about 1.10.

2. Pneumatic tire (1) according to claim 1, wherein the ratio between the modulus of elasticity ( $E'$ ) under compression at 100°C of the second elastomeric material and the modulus of elasticity ( $E'$ ) under compression at 100°C of the first elastomeric material is comprised between about 1.30 and about 1.50.

25       3. Pneumatic tire (1) according to claim 1, wherein the modulus of elasticity ( $E'$ ) under compression at 100°C of said first elastomeric material is comprised between about 4 and about 8 MPa.

30       4. Pneumatic tire (1) according to claim 1, wherein the modulus of elasticity ( $E'$ ) under compression at 100°C of said second elastomeric material is comprised between about 6 and about 12 MPa.

5. Pneumatic tire (1) according to claim 1, wherein the ratio between the IRHD hardness at 100°C of the second elastomeric material, measured in accordance with standard ISO 48, and the IRHD hardness at 100°C of the first elastomeric material, measured in accordance with standard ISO 48, is comprised between about 1 and about 1.05.
6. Pneumatic tire (1) according to claim 1, wherein the IRHD hardness at 100°C of the first elastomeric material, measured in accordance with standard ISO 48, is comprised between about 50 and about 70.
7. Pneumatic tire (1) according to claim 1, wherein the IRHD hardness at 100°C of the second elastomeric material, measured in accordance with standard ISO 48, is comprised between about 50 and about 70.
8. Pneumatic tire (1) according to claim 1, wherein the ratio between the Mooney viscosity ML (1+4) at 100°C of the second unvulcanized elastomeric material, measured in accordance with standard ASTM D5289, and the Mooney viscosity ML (1+4) at 100°C of the first unvulcanized elastomeric material, measured in accordance with standard ASTM D5289, is comprised between about 1 and about 1.10.
9. Pneumatic tire (1) according to claim 1, wherein the Mooney viscosity ML (1+4) at 100°C of the first unvulcanized elastomeric material, measured in accordance with standard ASTM D5289, is comprised between about 50 and about 60.
10. Pneumatic tire (1) according to claim 1, wherein the Mooney viscosity ML (1+4) at 100°C of the second elastomeric material, measured in accordance with standard ASTM D5289, is comprised between about 50 and about 60.
11. Pneumatic tire (1) according to claim 1, wherein said second elastomeric material comprises at least one diene elastomeric polymer reinforced with at least one reinforcing material selected from layered inorganic materials, short fibrillated fibers of polyamide materials and mixtures thereof, said at least one reinforcing material being dispersed in said diene elastomeric polymer.
12. Pneumatic tire (1) according to claim 11, wherein said first and second elastomeric material comprise respective diene elastomeric polymers having substantially the same mechanical characteristics.
13. Pneumatic tire (1) according to claim 11 or 12, wherein at least one layered inorganic material has an individual layer thickness comprised between 0.01 nm and 30 nm.

14. Pneumatic tire (1) according to any one of claims 11-13, wherein said second elastomeric material comprises from 1 to 80 parts by weight of said at least one layered inorganic material per 100 parts by weight of diene elastomeric polymer.
15. Pneumatic tire (1) according to claim 14, wherein said second elastomeric material comprises from 5 to 40 parts by weight of said at least one layered inorganic material per 100 parts by weight of diene elastomeric polymer.
16. Pneumatic tire (1) according to any one of claims 11-13, wherein said second elastomeric material comprises from 1 to 80 parts by weight of said short fibrillated fibers per 100 parts by weight of diene elastomeric polymer.
17. Pneumatic tire (1) according to claim 16, wherein said second elastomeric material comprises from 5 to 40 parts by weight of said short fibrillated fibers per 100 parts by weight of diene elastomeric polymer.
18. Pneumatic tire (1) according to any one of claims 11-17, wherein said second elastomeric material comprises at least one additional reinforcing filler, in amounts comprised between about 5 and about 80 phr.
19. Pneumatic tire (1) according to claim 18, wherein said additional reinforcing filler is in an amount comprised between about 10 and about 50 phr.
20. Pneumatic tire (1) according to claim 18, wherein said additional reinforcing filler is carbon black.
21. Pneumatic tire (1) according to claim 18, wherein said additional reinforcing filler is silica.
22. Pneumatic tire (1) according to claim 1, wherein the tread band (6) is provided with a plurality of transversal and/or longitudinal grooves (11) defined at respective portions (9) of the tread band (6) substantially consisting of the second elastomeric material.
23. Pneumatic tire (1) according to claim 1, wherein said at least one portion (9) of the tread band (6) substantially consisting of the second elastomeric material is shaped in this way as to form a lining (13) surrounding said at least one groove (11).
24. Pneumatic tire (1) according to claim 23, wherein said lining (13) has a thickness comprised between 1 and 10 mm.
25. Pneumatic tire (1) according to claim 1, wherein the tread band (6) comprises:

i) at least one first sector (9), radially extending, substantially consisting of said second elastomeric material;

5 ii) a plurality of second sectors (10), radially extending, positioned at axially opposite sides of said at least one sector (9), said second sectors (10) being substantially consisting of said first elastomeric material; and

wherein said at least one groove (11) is formed in said at least one first sector (9).

26. Pneumatic tire (1) according to claim 1 or 25, wherein said at least one groove (11) is a longitudinal groove (11) extending substantially for the entire circumferential development of the tread band (6).

10 27. Pneumatic tire (1) according to claim 26, wherein the tread band (6) is provided with a plurality of longitudinal grooves (11) and wherein said grooves (11) are formed in respective first sectors (9) of the tread band (6), radially extending and axially spaced apart from each other.

15 28. Pneumatic tire (1) according to claim 25, wherein said at least one first sector (9) is radially extending substantially for the entire thickness of the tread band (6).

29. Pneumatic tire (1) according to claim 1 or 25, wherein an additional layer (12) of elastomeric material is interposed between said tread band (6) and said belt structure (5).

30. Pneumatic tire (1) according to claim 29, wherein said layer (12) is substantially consisting of said second elastomeric material.

20 31. Pneumatic tire (1) according to claim 29, wherein said layer (12) has a thickness comprised between 1 and 5 mm.

32. Pneumatic tire (1) according to claim 25 or 26, wherein the width of said at least one first sector (9) is at least equal to the width of said at least one groove (11).

25 33. Pneumatic tire (1) according to claim 32, wherein the difference between the width of said at least one first sector (9) and the width of said at least one groove (11) is comprised between 4 and 10 mm.

34. Pneumatic tire (1) according to claim 25 or 26, wherein said at least one groove (11) is positioned astride the median plane (m) of said at least one first sector (9).